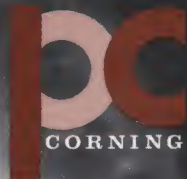


GEOCOUSTIC[®]

TO HEAR AND BE HEARD IN A ROOM...SIMPLIFIED BY THIS NEW ACOUSTICAL MATERIAL

PITTSBURGH



HOW A 3-DIMENSIONAL PRODUCT ACHIEVES BETTER ACOUSTICS

Because GEOCOUSTIC projects beyond the surface on which it's mounted, all six sides of a unit work in the interest of quality acoustics. And here is the secret of GEOCOUSTIC . . . sound literally surrounds each unit. This 3-dimensional factor gives GEOCOUSTIC its high capacity to absorb sound and to interrupt, or deflect, the movement of sound. Thus, GEOCOUSTIC's handling of these two forces, absorption and deflection, enables it to alter sound intensity and distribution in the support of communications within a room.

GEOCOUSTIC weds a new acoustical material with a long accepted acoustical technique to achieve these results:

1. Simplified control of room acoustics . . . with far less material at substantially lower cost.
2. Increased capacity to add visual interest to room surfaces with texture, scale, pattern and color.

The material is open cellular glass used to form panels 13½" square by 2" thick. They are called GEOCOUSTIC Units. Each unit is specially designed to deliver 2 full Sabins of sound absorption. This high unit absorption makes it practical, virtually for the first time, to take advantage of the patch technique—which experts have long recognized as the most desirable method for achieving the proper acoustical balance in a room.

The method is the Patch Technique. It calls for the arrangement of absorptive areas into sizes related to the wave lengths of sound and the placement of these areas in locations consistent with the patterns of sound behavior. In order to obtain the desired acoustical results, the unit absorbers are placed on both walls and ceilings of the room. With the Patch Technique, the units do not butt one against the other. As a result, no single surface is ever blanketed with absorption. Through this technique, Pittsburgh Corning GEOCOUSTIC Unit absorbers

help meet the following basic acoustical goals in room sound control:

- a) Favorable hearing conditions for speech or music.
- b) Elimination of acoustical defects such as echo, flutter, delay, distortion and poor distribution.
- c) Good diffusion, or dispersion, of sound.
- d) Effective control of noise.

The patch technique makes it possible to place precisely the right amount of sound absorption where it is needed in order to achieve the desired balance between sound absorption and sound reflection.

By using GEOCOUSTIC Units and the patch technique, it is now possible to achieve faithful acoustics in many average spaces—such as classrooms—with as few as 50 units.

Succeeding pages contain detailed information on the following areas of application:

The GEOCOUSTIC Unit	pages 4 and 5
Designing with GEOCOUSTIC Units	pages 6 and 7
Acoustical Correction.....	pages 8 and 9
Application Data and Specifications	pages 10 and 11
The GEOCOUSTIC Distributor	back cover



GEOCOUSTIC HAS 6 WORKING SURFACES

All six sides of a GEOCOUSTIC Unit are working surfaces. Color indications show sound completely surrounding each unit for added absorption and deflection. GEOCOUSTIC'S unique design now permits a true acoustical material to function in the best interest of balanced sound control...the key to success in room acoustics.

THE GEOCOUSTIC UNIT

ACOUSTICAL PROPERTIES—The significance of the GEOCOUSTIC Unit is that it is designed first and foremost as an acoustical device . . . not simply as a structural or aesthetic element with collateral acoustical properties.

In manufacturing the GEOCOUSTIC Unit, Pittsburgh Corning creates an open structure of interconnecting glass cells. These form an intricate labyrinth of chambers through which sound striking the unit is dispersed and dissipated. This basic sound absorption is augmented by two additional features of the unit.

First, the mounting allows the edges to provide advantageous "area effects." Second, the back of the GEOCOUSTIC Unit has been specially shaped to create a resonant cavity. Together these two features enhance the absorptive capacity of GEOCOUSTIC. Charts shown here, detail completely the absorption and the performance characteristics of GEOCOUSTIC Units through various frequency ranges.

ABSORPTION OF GEOCOUSTIC UNITS—SABINS PER UNIT

Frequencies (cps)	125	250	500	1000	2000	4000
*Absorption Sabins 32" o.c. (Patch)	.13	.74	2.35	2.53	2.03	1.73
24" o.c. (Patch)	.18	.73	2.08	2.27	1.91	1.66
16" o.c. (Strip)	.19	.71	2.07	2.15	1.76	1.56

The above figures will vary slightly with spacing and placement but for nearly all practical applications of reverberation control and room quieting an average figure of 2.0 sabins will be realized within the range of speech frequencies.

Where more uniform absorption (a flatter curve) with less absorption at higher frequencies is desired, as for music rooms, it may be achieved by placing units on 16" centers in patches or over large areas, as indicated by the following absorption data:

16" o.c. (Patch)	.30	.70	1.61	1.62	1.37	1.31
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*NOTE: As measured by Geiger and Hamme Laboratories, Ann Arbor, Michigan, in accordance with ASTM Designation: C423-58T, Tentative Method of Test for Sound Absorption of Acoustical Materials in Reverberation Rooms.

REVERBERATION COMPARISON FOR TYPICAL CLASSROOM INSTALLATION

Center Band Frequencies (cps)	100	200	500	1000	2000	4000
Untreated Classroom Reverberation Times (Room 111)	1.7	1.6	2.0	1.9	1.4	1.3
Treated Classroom Reverberation Times (Room 211)	1.3	1.4	1.0	1.1	1.1	1.1
BERKELEY ELEMENTARY SCHOOL BERKELEY, MICHIGAN June 26, 1961 Hunter & Carome, Acoustical Engrs. Cleveland, Ohio Treatment: 50 GEOCOUSTIC Units mounted along intersection between walls and ceiling						

PHYSICAL PROPERTIES—Physically, the GEOCOUSTIC Unit is inorganic, incombustible, strong, dimensionally stable and unaffected by moisture. It will not shrink, warp or change shape with temperature changes or high humidity. Perhaps most important, GEOCOUSTIC is integral. There is no internal binder. No possibility exists for delamination even in such demanding high humidity applications as swimming pools.

The acoustical and physical properties of GEOCOUSTIC Units give them a wide range of use for promoting sound intelligibility, or room quieting, in new design or remodeling applications ranging from classrooms, offices, swimming pools or gymnasiums to lecture halls, auditoriums and theaters. Succeeding pages detail some of these uses.

SOUND INTELLIGIBILITY FOR EVERY ROOM

GEOCOUSTIC makes practical the patch technique in the control of both wanted sound and unwanted sound. GEOCOUSTIC'S versatility facilitates the design of reinforcement for wanted sound, or the efficient reduction of unwanted sound, as required, in a room.

Wanted Sound—In auditoriums, classrooms, lecture halls, the need is for reinforcement and balanced distribution of clear, intelligible words so that the speaker can be understood. This is wanted—and controlled sound. It depends entirely upon achieving the proper balance between sound absorption and sound reflection in the room. Now you can obtain this degree of clarity with Pittsburgh Corning's GEOCOUSTIC in combination with the patch technique.

Here's where Wanted Sound is important:

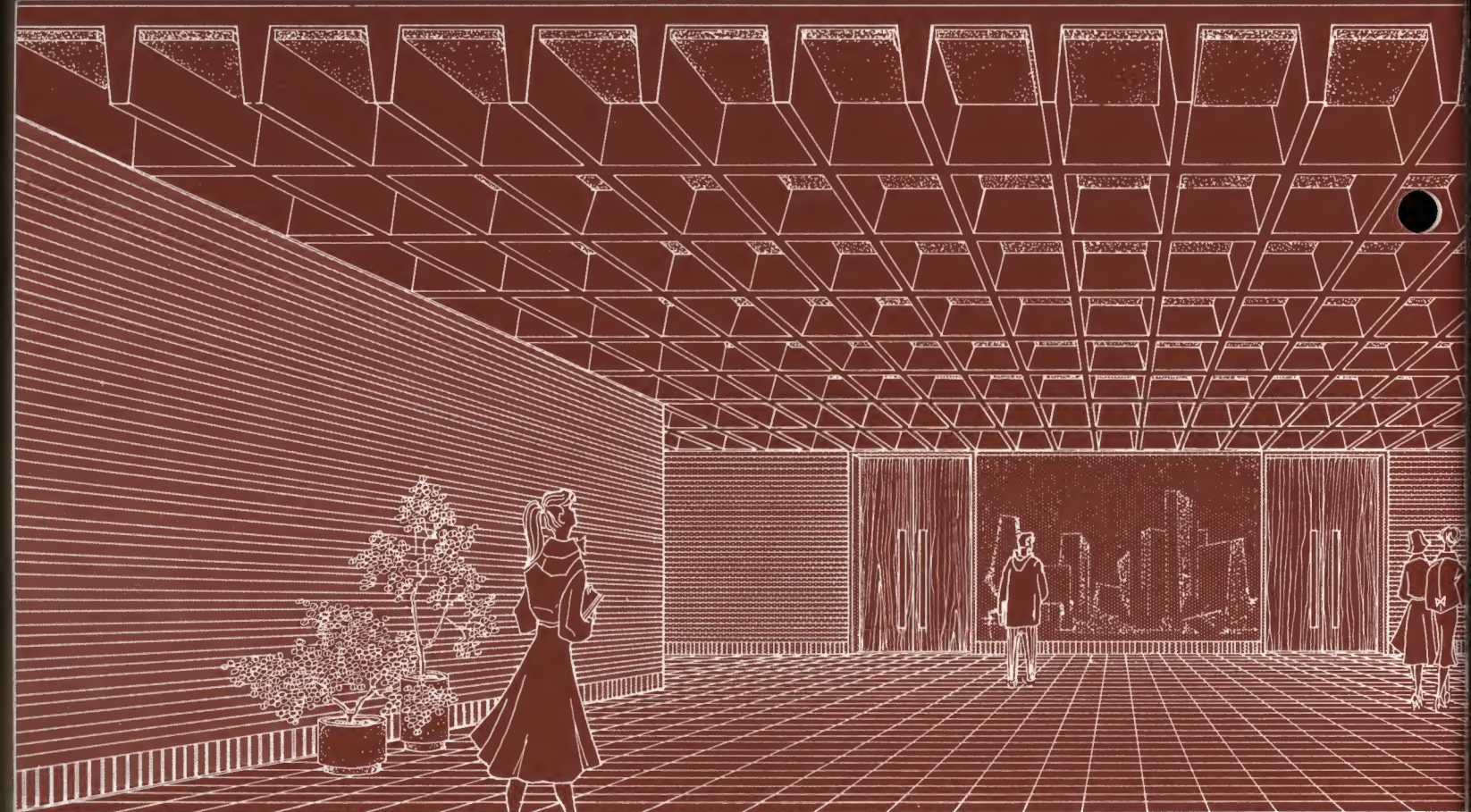
- Class Rooms
- Music Rooms
- Lecture Halls
- Auditoriums
- Conference Rooms
- Sound Studios

Unwanted Sound—In swimming pools, gyms, corridors, the main problem is eliminating echoes, flutter and excessive reverberation. This is unwanted sound. Because of their high absorptive quality, GEOCOUSTIC units are well-suited for putting the damper on noisy areas. When used for quieting a noisy room, the patch technique, with GEOCOUSTIC, is both efficient and economical.

Here's where Unwanted Sound must be regulated:

- Offices
- Gymnasiums
- Swimming Pools
- Cafeterias
- Lobbies
- Corridors





Coffered ceiling

DESIGNING WITH GEOCOUSTIC UNITS

ACOUSTICAL DESIGN—In the area of design for new construction, GEOCOUSTIC Units offer a number of important advantages. First and most important is the relative simplicity of the design problem from the acoustical standpoint.

In most areas it is a relatively simple matter to calculate the amount of absorption needed to achieve the desired acoustical environment. Experience has proved that, in most cases, the number of GEOCOUSTIC Units equivalent to 1% of the room's volume will be sufficient to insure optimum intelligibility of sounds in that room. See opposite page for estimating requirements of typical situations.

Placement of the individual units need pose no serious technical problems. In most cases, simply insuring that the GEOCOUSTIC Units used are placed around the room on the upper walls and along the perimeter of the ceiling will bring fully satisfactory results.

Where more room quieting is necessary to eliminate unwanted noise, a greater number of GEOCOUSTIC Units will be needed. In this, or any specific acoustical problem, you may wish to consult one of the PC District Offices listed on the back cover of this booklet. Each is fully qualified to offer advice

on the number and placement of GEOCOUSTIC Units.

VISUAL DESIGN—Because rigid limitations are not imposed on the number and placement of GEOCOUSTIC Units in a given room, you are given broad latitude in the area of visual design. Projecting, as they do, from the surface on which they are placed, these units present new ways in which to add dramatic three dimensional effects to the normally plain surfaces of wall and ceiling.

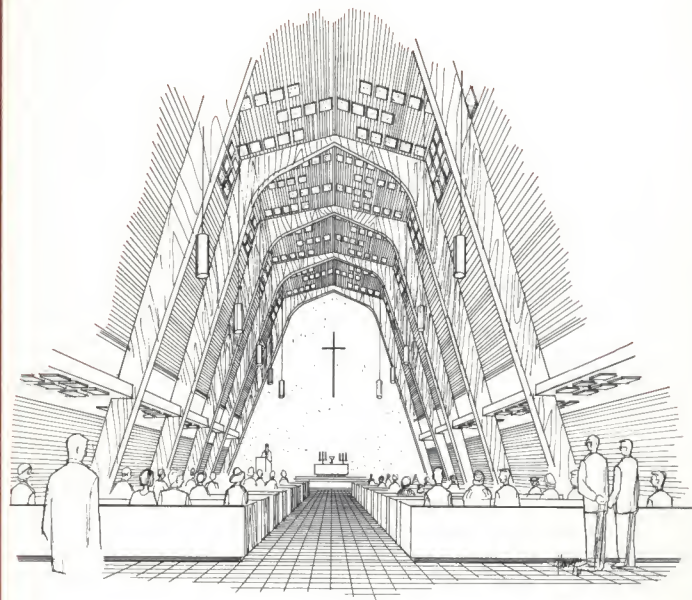
Moreover, a wide range of pattern effects is possible through groupings of two or more GEOCOUSTIC Units as a design element. Utilizing this capacity, it is even possible to achieve unusual visual effects by altering the apparent scale of a wall or ceiling area.

And since paint can be easily applied to GEOCOUSTIC Units, it is possible to create added interest through harmonizing or contrasting colors to fit the specific interior setting. Units can be emphasized or de-emphasized with color.

The architectural sketches on these pages indicate the design latitude possible for incorporating GEOCOUSTIC in typical installations requiring acoustical control.



Laminated wood beams
and wood deck



ESTIMATING GEOCOUSTIC

Approximate number of units required in rooms of normal volume, occupancy, and finish detail:

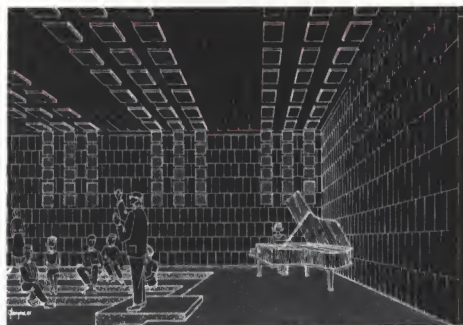
Type Room	*No. of GEOCOUSTIC Units
School Classrooms.....	50 units
Choral Room with Ac. Ceiling	$\frac{3}{4}\%$ of Room Volume
Choral Room without Ac. Ceiling ..	1% of Room Volume
Band Room with Ac. Ceiling	1% of Room Volume
Band Room without Ac. Ceiling	$1\frac{1}{2}\%$ of Room Volume
Lecture Room.....	1% of Room Volume
Conference Room.....	1% of Room Volume
Gymnasium.....	1% of Room Volume
Multi-Purpose Room.....	1% of Room Volume
Swimming Pools.....	1% of Room Volume
Court Room.....	1% of Room Volume
Committee Room.....	1% of Room Volume
Study Room.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Libraries.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Lobbies, Vestibules.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Dining Rooms.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Restaurants, Lounges, Cafeterias.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Offices, Stores, Banks.....	$1\% - 1\frac{1}{2}\%$ of Room Volume
Theatres, Auditoriums, Churches.....	Generally, $\frac{1}{2}\%$ to 1% of Room Volume, but are best analyzed by competent acoustician.
Broadcast, Recording Studios.....	Generally, $1\frac{1}{2}\%$ to 2% of Room Volume, but are best analyzed by competent acoustician.

*Note:

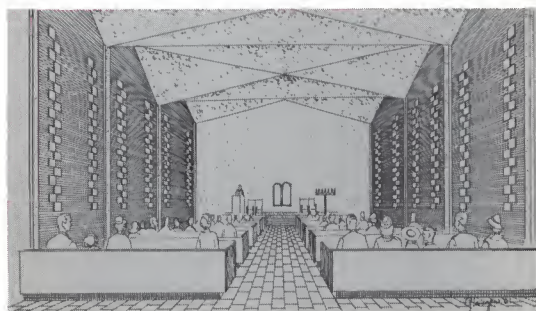
Variations, where indicated, are for room volume, furnishings, and acoustical preference. Smaller rooms generally require larger percentage and larger rooms vice versa.



Prefabricated panel walls and
louvered drop ceiling

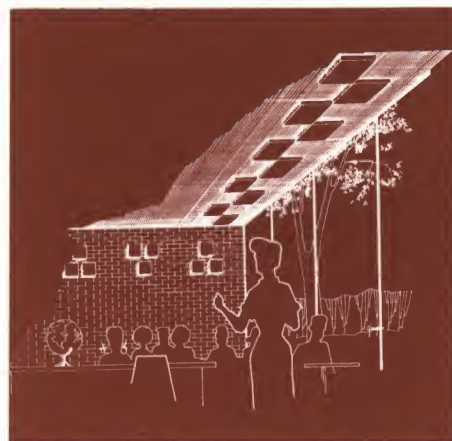


Block walls and
pre-cast concrete deck



Brick walls and concrete
folded plate roof

ACOUSTICAL CORRECTION WITH GEOCOUSTIC UNITS



In the classroom

GEOCOUSTIC Units can be placed on existing room surfaces without specially treating or replacing those surfaces. This has made them an ideal material for improving the acoustical environment in existing rooms. The same general rules for number and placement of GEOCOUSTIC Units, shown on page 7, apply in both corrective and new design applications.

In correctional applications, GEOCOUSTIC Units afford several unique benefits. Perhaps most important is the time factor. Since no special treatment of room surfaces is necessary—and since relatively few units, each quickly and easily applied, are needed—many average rooms can be acoustically corrected with GEOCOUSTIC Units in a day or two. Thus, it is often possible to complete a series of classrooms, for instance, during as short a period as a mid-year recess. The important savings in labor costs are self-evident.

Where present acoustics are unsatisfactory, it will pay you to investigate the many important correctional values of GEOCOUSTIC Units: when wanted sound must be made more intelligible as in classrooms, offices, lecture rooms, music rooms, auditoriums, conference rooms, etc.; or when unwanted sound must be eliminated as in swimming pools, cafeterias, lobbies, corridors, or gym-

nasiums. GEOCOUSTIC may be the answer. Illustrations shown here depict a number of highly successful correctional applications of GEOCOUSTIC Units.

EVALUATE YOUR OWN SITUATION—
A check list of some acoustical factors which may indicate a need for GEOCOUSTIC Units.

Acoustics, both good and bad, are with us all the time in every room. Clap your hands in any room and listen for the results.

☐ Do you hear a pronounced echo . . . a distinct flutter? This room is too lively, overly hard surfaces make sound reflection too strong. Sounds overlap each other. Confusion results.

☐ Does the sound of your handclap seem to fade and die instantly? The room has dead quality. It probably suffers from too many soft materials, too much absorption, improperly placed.

☐ If the sound is clear and crisp . . . sustained long enough but only long enough to be distinct your room has a proper balance between sound reflection and absorption.

If acoustical defects are revealed by your handclap, a correctional application of GEOCOUSTIC Units can quickly improve the situation at relatively low cost.



In the cafeteria



In the theater



In the bowling alley

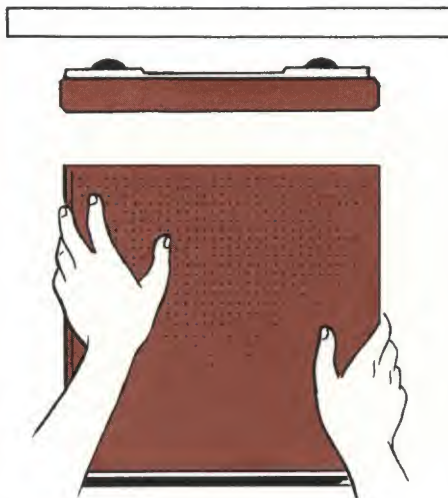


In the gymnasium



In the broadcasting studio

APPLICATION DATA AND SPECIFICATIONS



CEMENT APPLICATION

GEOCOUSTIC Units are usually installed on the following surfaces with GEOCOUSTIC Cement only: white-coat plaster, lightweight aggregate plasters, brown-coat plaster, brick, concrete, concrete block, rigid plaster-board, rigid gypsum board, painted surfaces on the foregoing, glazed tile, ceramic tile.

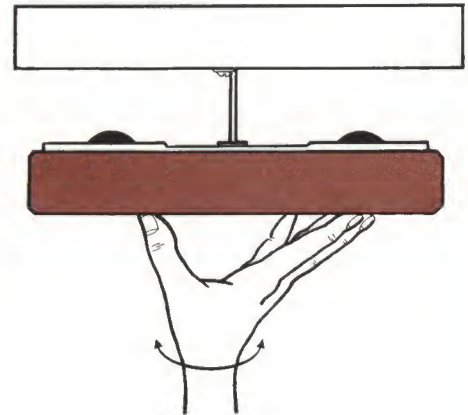
Surfaces to receive acoustical treatment shall be secure, firm, and completely dry, reasonably smooth, and free from all dirt, loose paint or other irregularities. Best results are obtained with surface temperatures between 65° and 100° F.

STEP 1. APPLYING CEMENT • Apply GEOCOUSTIC Cement in four (4) small daubs of walnut size, approximately $\frac{3}{4}$ to 1 cubic inch per daub, using small mason's trowel or putty knife. Daubs should be located on raised back section of unit $3\frac{1}{2}$ " in from each corner edge. Daubs should be cut off cleanly by pressing edge of tool to the unit. Do not smear or spread GEOCOUSTIC cement over the surface prior to placing daubs on unit.

STEP 2. AFFIXING TO RECEIVING SURFACE • The GEOCOUSTIC Unit is now ready for direct application to the receiving surface. The unit should be gripped firmly at edges and set directly to the receiving surface with a strong manual pressure applied uniformly so as to compress the cement daubs to a thickness not exceeding $\frac{1}{8}$ ". A slight rotary or shaking motion should be used as pressure is applied to the unit, thus "grinding" the unit to the surface. Setting blocks, jigs, or a ruler may be used to provide proper spacing of each unit. The unit will generally be well set when slight resistance is felt to the rotary or shaking motion from the initial "grab" of the cement on the two surfaces.

STEP 3. SETTING ADJUSTMENT • Adjustment of a set unit to final alignment or position should never be done by one-sided pressure on the unit. Final adjustment should be made with the same strong uniform pressure and rotary or shaking motion outlined in Step 2. To do this, push broadly

on the face of the unit with the flat palms of both hands or hold the two side edges firmly in the grip. If readjustment involves more than $\frac{1}{4}$ ", or if a significant time delay occurs after the initial set, the unit should be taken down, the cement spots should be cleaned from all surfaces, and the unit re-set in the proper manner.



MECHANICAL APPLICATION

GEOCOUSTIC Units should be installed on the following surfaces with the PC safety fastener: radiant heated ceilings, uninsulated roof decks, metal roof decks, swimming pool ceilings, asphalt-coated surfaces, semi-rigid boards, wood. No special preparation is required on these surfaces.

Note: Two daubs of cement shall be applied on center line of unit on raised back sections in same manner as specified under Step 1, Cement Application.

STEP 1. SELECT PROPER FASTENER • The PC safety fastener consists of a speed clip inserted in the unit at time of manufacture plus a spindle pin. Pittsburgh Corning does not supply the stud, screw or other fastener required to secure spindle pin to ceiling or wall. It is therefore important to select a fastener suitable for the mounting surface and one that can support the unit. A flat-head fastener of maximum $\frac{3}{16}$ " shank diameter is generally recommended.

STEP 2. INSTALL SPINDLE PIN • The center point of each GEOCOUSTIC Unit to be installed should be determined. At each of these center points, the spindle pin should be installed. A $\frac{1}{4}$ " offset should be allowed from the center point for the loop.

STEP 3. IMPALE SPEED CLIP • Holding the GEOCOUSTIC Unit in one hand, start the factory-installed speed clip onto the spindle pin by tilting the unit slightly. Be sure parts are aligned. Then, level the unit by tilting and rotating slightly until the pin enters the clip. The unit may then be pushed upward until the previously applied cement, takes hold. Set the unit in final position in the regular manner to the surface. Use only two daubs of cement, located as shown in illustration, with the PC safety fastener.



ARCHITECTURAL SPECIFICATIONS

Acoustical treatment shall consist of approximately 00 unit acoustical absorbers applied to wall and ceiling surfaces of rooms in spaced arrangements as indicated on the drawings or otherwise selected and approved by the architect; all units to have a rated absorption of not less than 2.0 sabins at 500 cps when tested in accordance with ASTM Code Designation C423-58T; all units to be non-laminated, integral, without internal binder or reinforcement, composed of inert, inorganic, incombustible material (of cellular structure) with exposed edges finished in manner similar to face finish, and not to exceed 2 lbs. in unit weight; all units shall be factory-produced, factory-finished and factory-inspected.

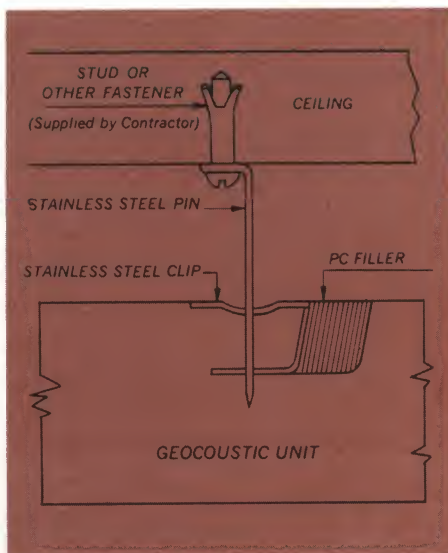
Installation of acoustical units shall be made by either cement or mechanical attachment as indicated on the drawings, required by the manufacturer, or otherwise selected and approved by the architect, and all work in connection therewith shall be done by authorized acoustical contractor only, as approved by the architect.

PAINTING GEOCOUSTIC UNITS

GEOCOUSTIC Units are supplied in white only. They can be painted any desired color on the job by spraying either before or after installation. In addition, they can be cleaned easily by washing or sponging with soap and water, or by dry-cleaning with brush or vacuum cleaner.

ACCESSORIES AND SHIPPING DATA

SPINDLES FOR SAFETY FASTENER UNITS
Stainless steel spindles are packed 13 to an envelope. These are taped to the inside of each carton of GEOCOUSTIC Units with safety fasteners.



GEOCOUSTIC CEMENT Pittsburgh Corning provides a cement specially compounded for the adhesive mounting of GEOCOUSTIC Units. It should be specified for use between a minimum temperature of 60°F. and a maximum temperature of 110°F. Coverage is one gallon per 100 to 125 units. When safety fasteners are used, coverage is one gallon per 200 to 250 units.

5 gallon pail.....59 pounds gross weight
1 gallon cans.....50 pounds per carton
(4 per carton)

GEOCOUSTIC UNITS Each GEOCOUSTIC unit measures 13½" x 13½" x 2". Each has two raised sections on the back, 12½" x 3¾", for mounting. A ¼" recess area 12½" x 5" between the raised sections provides a resonant cavity behind the unit. Edges have a standard ¼" bevel. Weight is approximately 2 pounds.

SHIPPING CARTONS GEOCOUSTIC units are packed 12 to a carton. Each unit is protected by a corrugated divider which makes for easy handling at the job site. Gross shipping weight per carton is approximately 27 pounds.



THE GEOCOUSTIC[®] DISTRIBUTOR

If you are an architect, interior designer, school administrator or building supervisor, call or write your nearest Pittsburgh Corning District Office listed below for the name of your local PC GEOCOUSTIC distributor.

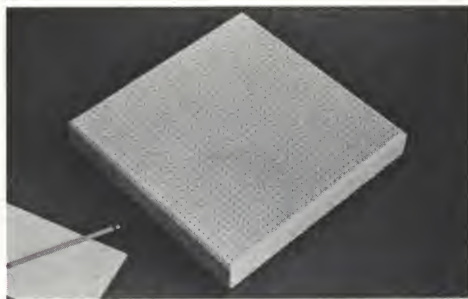
The GEOCOUSTIC distributor is highly trained and specially chosen by Pittsburgh Corning to handle Geocoustic installations. He is well equipped to survey your job, make recommendations and estimates, and install GEOCOUSTIC units to meet your requirements in this field.

For better room acoustics, select GEOCOUSTIC Units, an acoustical material with the prime function of sound control; select a PC GEOCOUSTIC distributor, a contractor experienced in the patch technique.

Call or write today for information: Pittsburgh Corning Corporation, One Gateway Center, Pittsburgh 22, Pa.



GEOCOUSTIC a material and a method . . . to hear and be heard in a room.



A NEW MATERIAL USING A PROVEN METHOD lets Pittsburgh Corning combine cellular glass panels with the patch technique for a new standard in room acoustics.



USER ACCLAIM—INCREASED ACCEPTANCE that's the GEOCOUSTIC story since its introduction in 1960. Schools, like Sheridan Public, Bloomington, Illinois, are one of many primary customers.



THE GEOCOUSTIC DISTRIBUTOR your best equipped source to specify and contract a GEOCOUSTIC, patch-technique installation.

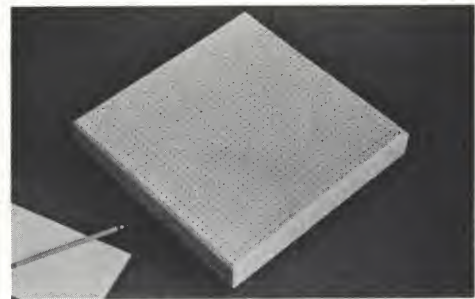


THE PC ACOUSTIC LABORATORY and its staff support the GEOCOUSTIC Distributor through a continuing program of testing and consulting.

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A NEW MATERIAL USING A PROVEN METHOD lets Pittsburgh Corning combine cellular glass panels with the patch technique acoustics.

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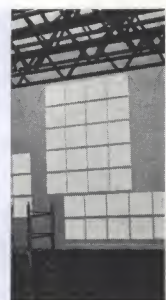


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IBUTOR your
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